



# The U.S. ATLAS HL-LHC Upgrade Project

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# Outline

- ❖ US ATLAS HL-LHC Project Office
- ❖ Near term priorities
- ❖ Project organization
- ❖ Project Office roles and responsibilities
- ❖ Duty cycle of the PO principals
- ❖ Overview of project timeline



# Near-Term Project Priorities

- ❖ Maintain project-wide technical progress.
- ❖ Develop a detailed Resource Loaded Schedule (RLS) and the overall project plans, for both DOE- and NSF-funded scope.
  - With an eye toward developing project plans targeting agency approval processes and associated timelines.
- ❖ Manage and oversee the distribution of project funds.
- ❖ Attend to staffing development at all levels to support project execution.
  - Further strengthen a team that will support the realization of project goals and agency requirements.



# Project Scope, General Scale

- ❖ Each of the eight L2 systems is funded by a unique source (DOE, NSF).
  - Sole exception is LAr, which is split between NSF/DOE.
  - DOE scope: Silicon (Pixels, Strips and Global Mechanics) and DAQ.
  - NSF scope: LAr, Tile Calorimeter, Muon and Trigger.
- ❖ The structural groundwork for all eight WBS Level 2 systems has been laid in the RLS, and resource loading is proceeding.
  - See presentation from Brooijmans.
- ❖ The project scope is cleanly apportioned, and there is a discrete separation of the deliverables.
  - Interfaces between the two sets of deliverables are minimal.
- ❖ The upgrade scope is well defined and circumscribed, within currently understood U.S. funding guidelines and any design maturity limitations that may exist on the international level.



## Example WBS to Level 4: Liquid Argon (6.4)

6.4	L2 Manager: J. Parsons, M.-A. Pleier (Dep)	CAMs	Institutional Contacts
6.4.1	<b>FE Electronics</b>	Tim Andeen	
6.4.1.1	FE Electronics-Columbia		John Parsons
6.4.1.2	FE Electronics-UTAustin		Tim Andeen
6.4.1.3	FE Electronics-SMU		
6.4.1.3.1	Serializer ASIC		Jingbo Ye
6.4.1.3.2	VCSEL array driver ASIC		Jingbo Ye
6.4.1.3.3	Optical Transmitter Module (OTx)		Jingbo Ye
6.4.2	<b>FEB2</b>	John Parsons	
6.4.2.1	Columbia		John Parsons
6.4.3	<b>BE Electronics</b>	Andy Haas	
6.4.3.1	BE Electronics-SB		John Hobbs
6.4.3.2	BE Electronics-Arizona		Ken Johns
6.4.4	<b>System Engineering</b>	Marc-Andre Pleier	
6.4.4.1	FEB2 Integration-BNL		Hucheng Chen
6.4.4.2	System Integration-BNL		Hucheng Chen
6.4.5	<b>PA Shaper</b>	Hong Ma	
6.4.5.1	PA Shaper-BNL		Hong Ma
6.4.5.2	PA Shaper-Penn		Mitch Newcomer
6.5	<b>Tile</b>		
6.5.1	<b>Main Board</b>	Mark Oreglia	
6.5.1.1	Chicago		Mark Oreglia
6.5.2	<b>Pre-proc Bd</b>	Kaushik De	
6.5.2.1	Pre-proc Bd-UTA		Giulio Usai
6.5.3	<b>ELMB</b>	Joey Huston	
6.5.3.1	ELMB-MSU		Joey Huston
6.5.4	<b>LVPS</b>	Haleh Hadavand	
6.5.4.1	LVPS-UTA		Andrew Brandt
6.5.4.2	LVPS-NIU		Dhiman Chakraborty

- ❖ CAMs = Cost Account Managers (Level 3)
- ❖ ICs = Institutional Contacts (Level 4)
- ❖ Uniform, hierarchical structure throughout the WBS.
- ❖ All personnel are in place through Level 4.

Eight L2 systems,  
35 CAMs, 72 ICs,  
39 Collaborating  
U.S. Institutions.



# Project Organization to WBS Level 3

## U.S. ATLAS HL-LHC Upgrade Project Office

J. Kotcher (BNL), Project Manager  
 G. Brooijmans (Columbia), Deputy, Project Development  
 X. Guo (BNL), Deputy, Business Management  
 M. Tuts (Columbia), NSF Principal Investigator  
 J. Hobbs (SBU), Operations Cooperative Agreement PI  
 H. Evans (Indiana), Technical Coordination and Systems Engineering  
 Risk Manager (TBD)  
 G. Redlinger (BNL), Risk Deputy  
 ES&H Liaison – A. Franz (BNL)  
 QA Liaison – J. Eng (BNL)

**Budget & Administration:**  
 C. Wang (BNL), Budget Analyst  
 C. Butehorn (BNL), Budget Oversight  
 A. Garwood (Columbia), Administration  
 General Administration (BNL)

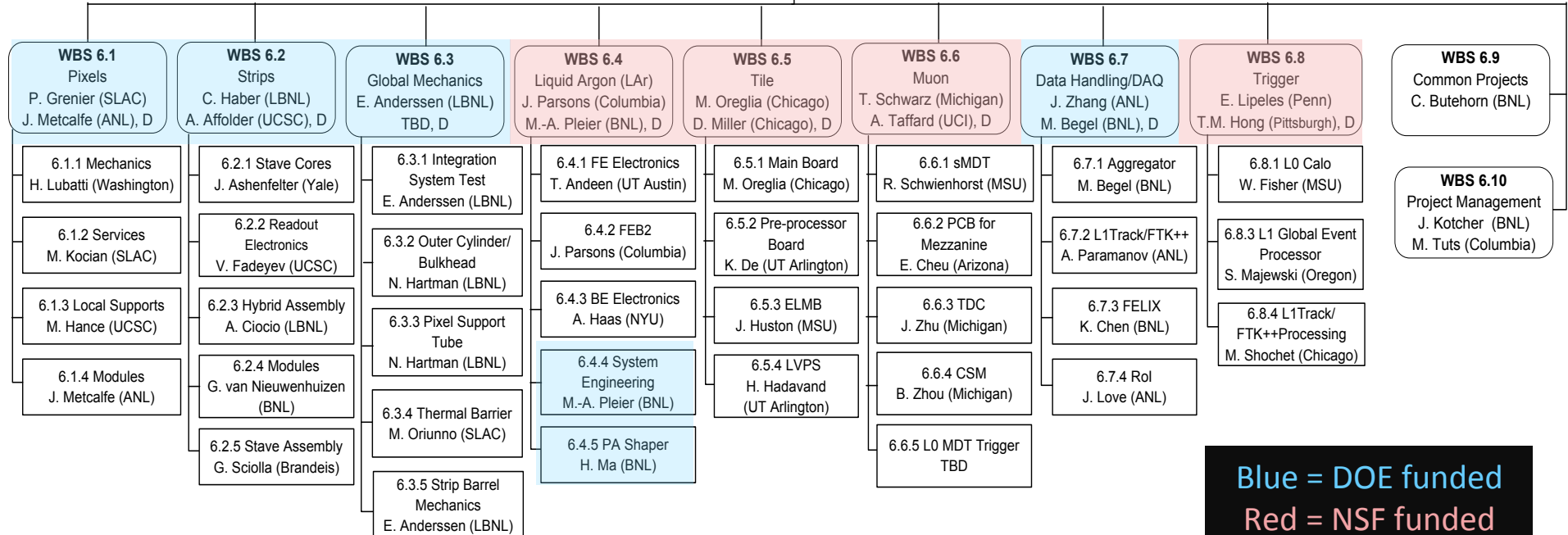
All Project personnel are in place to WBS Level 4.

Project Advisory Group  
 M. Reichenadter (SLAC), Chair

Program Management Group  
 D. Lissauer (BNL), Chair

### Legend

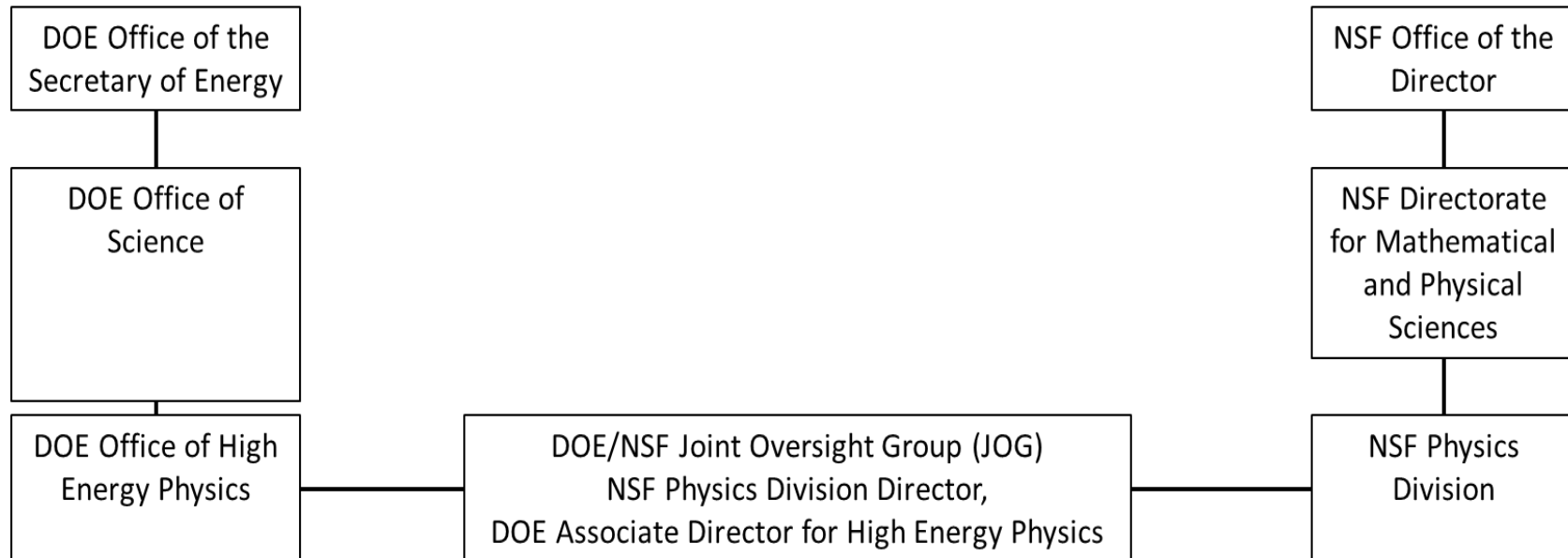
Reporting ———  
 Advisory - - - - -  
 Oversight →



Blue = DOE funded  
 Red = NSF funded



# High Level Organizational Overview



The Joint Oversight Group (JOG) acts as the principal oversight body for the HL-LHC project.

The Project reports in line management to its corresponding sponsoring agency.



## US ATLAS HL-LHC Project Office (1)

- ❖ The US ATLAS HL-LHC Upgrade Project is managed in an integrated fashion out of a central BNL office, which supports both the NSF and DOE scope.
  - It is supported via both NSF and DOE funds.
  - Administrative and financial analysis support at Columbia.
- ❖ All major issues – cost, scope, risk, funding, RLS development, staffing/personnel, PO management – are collectively managed.
  - The PO principals (Brooijmans, Evans, Guo, Kotcher, Tuts, Hobbs) meet min. 3X per week to go over all relevant issues.
- ❖ The Project principals and support staff have a long history of working together on DZero and ATLAS.
- ❖ The upgrade is managed through the same institutions that have served as the principal organizations in the US ATLAS original construction, M&O and Phase I upgrade (BNL, Columbia, SBU).



## US ATLAS HL-LHC Project Office (2)

- ❖ The collaborative PO approach makes the most effective use of the broad range of PO expertise, and introduces a system of checks and balances on decision-making that we find highly advantageous, even necessary, for a project of scale.
- ❖ Nevertheless, for large projects supported by two funding partners imposing their own requirements, the roles and responsibilities of each PO principal must have a primary focus.
- ❖ The following description of these roles were drafted to outline not the full suite of each principal's participation, but his/her responsibility of focus in overall Project execution.



## Note on RLS Construction

- ❖ Our model for RLS development is based in part on exploiting the expertise of P6/COBRA contractors (Manta Ray), under the day-to-day guidance of Brooijmans and Guo.
- ❖ This helps to ensure a product that conforms to current best practices, is uniform across the Level 2 systems and will facilitate project reporting and EVMS once baselines are established.
- ❖ BNL has deep and long standing institutional expertise in, and knowledge of, the management of the ATLAS project.
  - Budgets, administrative, scientific and technical management, international dimension and requirements, etc.
- ❖ There is, however, no central repository or pool/office of Laboratory project support on which to draw that is knowledgeable in international HEP projects and constraints. All expertise is developed from within the US ATLAS collaboration, or hired.



# PO Roles and Responsibilities (1)

## ❖ Project Manager (Kotcher)

- Overall management and coordination of US ATLAS HL-LHC Project
- Principal representative of the Project
- Decisional authority in project matters – cost, contingency, scope, etc.
  - Any internal PO conflicts are resolved in the JOG
- POC to DOE
- Establishing global priorities for use of Project Office (PO) resources



## PO Roles and Responsibilities (2)

### ❖ Deputy, Project Development (Brooijmans)

- Management and development of all aspects of NSF scope
  - Cost, schedule, technical scope, integration, etc.
- Determination of funding allocations to NSF subprojects and PO
- Representation of NSF Project scope to the agency
- Co-development of DOE scope

### ❖ Deputy, Business Management (Guo)

- Development of project plan and its translation into RLS and related project material
- Management and coordination of project personnel in RLS planning and development
- Management and coordination of PO and its resources
- Co-development of DOE and NSF scope



## PO Roles and Responsibilities (3)

### ❖ NSF Principal Investigator (Tuts)

- Serves as NSF PI for the Project
- Management, oversight and tracking of the receipt and distribution of NSF MREFC funds
- Design and presentation of HL-LHC physics case in the global HEP context
- POC to NSF and DOE for HL-LHC global science case

### ❖ Operations Cooperative Agreement PI (Hobbs)

- Develops pre-MREFC allocations in tandem with Project
- Distribution of funds to the HL-LHC institutions
- Oversees Stony Brook institutional responsibilities for MREFC pre-construction



## PO Roles and Responsibilities (4)

### ❖ Technical Coordination & Systems Engineering (Evans)

- Design and management of interface between physics goals and upgrade implementation
  - Flow down, technical approaches, design specifications
- Management and coordination of the technical evolution and integration of the Level 2 systems, and related US project-wide scope development
- POC for integration of US systems within the International ATLAS upgrade
- Development and maintenance of the Systems Engineering Management Plan

### ❖ Risk Manager and Deputy (TBD, Redlinger)

- Dedicated Risk Management Team to continue the development and management of the project-wide risk approach, planning and execution
- Design and implement risk Monte Carlo and techniques (P6, etc.)
- Integration of risk and related contingency into project plan
- Maintain and develop Risk Management Plan



## PO Roles and Responsibilities (5)

### ❖ Project Budget Analyst (Wang)

- Track funding contracts and ensure consistency with project baseline
- Manage accruals and invoice reconciliation, providing input to cost performance reports
- Implement and track baseline change proposals (BCPs) and funding amendments

### ❖ MREFC Administration (Garwood)

- Grant management and budget analysis
- Tracking of subcontracts in accordance with project baseline
- Invoice cross-checking and reconciliation
- Implementation and tracking of BCPs and sub-award amendments

### ❖ Project Controls (Manta Ray), ES&H and QA Liaisons, Administrative and Budgetary support



# PO Principals: FTE Fractions

## ❖ Kotcher – 80%

- 20% Laboratory administrative responsibilities, Phase I advisement

## ❖ Brooijmans – 80%

- Teaching buyout and sabbatical for 2017-18 academic year

## ❖ Guo – 50%

- Shared with Phase I, Laboratory responsibilities

## ❖ Evans – 80%

- Ongoing teaching buyout

## ❖ Tuts – 30%, increases to 80% in Fall (sabbatical)

- Department Chair responsibilities end June 2017

## ❖ Manta Ray (Project Controls) – 1.7 FTE

- Three principals, shared in development of both NSF and DOE scope, according to priorities set in PO
- Much progress has been made since the mini-review – see talk from Brooijmans



## Near Term Funding Status

- ❖ The DOE portion of the project is being funded out of OPC (Other Project Costs).
- ❖ Two allotments of DOE FY17 funds have been received from DOE and distributed to the project (Oct & Dec 2016).
  - These two FY17 allocations were pro-rated by DOE, in accordance with the ongoing Continuing Resolution (CR).
  - DOE told us that they have been mandated to distribute only the June allotment from the omnibus bill thus far.
- ❖ See subsequent talks (Hobbs, Brooijmans) for an update of the NSF funding of the HL-LHC project development activities.



# High Level Working Timeline

- ❖ Oct '16 – Jan '17 – Finalize RLS task lists.
  - Internal logic and links, external constraints, milestones, etc.
- ❖ February – Begin resource loading and internal scrubbing.
- ❖ March 21-22 – Director's Review (DR) for NSF PDR mini-review.
- ❖ Apr 11-12 – NSF PDR mini-review.
- ❖ May 16-19 – Detailed scrubbing of loaded RLS at BNL/Columbia.
- ❖ June – Initial roll-up of full RLS.
- ❖ Fall – DOE CD-1 review (preceded by CD-1-specific DR).
- ❖ Jan '18 – NSF PDR review (CD-2 level, preceded by PDR-specific DR).

Budget uncertainties may very well impact this schedule. Thus far, the FY18 President's budget has prompted OHEP to recommend we move CD-1 into late CY18/early CY19.



## Closing Remarks

- ❖ The project is focused on maintaining technical progress, developing a viable project plan and RLS, remaining engaged with International ATLAS as designs evolve and addressing agency project approval requirements.
- ❖ The plan is being constructed by a strong and highly engaged team.
- ❖ Advisory and oversight committees are being assembled that will help guide the project through the various stages.
- ❖ Communications with both agencies, and with U.S. CMS, are frequent, frank and extremely productive.
- ❖ The PO continues to adapt its preparations to address the winter approval timeline, optimizing all resources at our disposal.
- ❖ We will continue to develop the strongest U.S. participation possible in the HL-LHC upgrade, which will enable the LHC physics opportunities well into the coming decade and beyond.



# Backup



# Upper Project Management

- ❖ The core group in U.S. ATLAS HL-LHC Upper Management:
  - J. Kotcher (BNL), PM
  - M. Tuts (Columbia), NSF Principal Investigator
  - G. Brooijmans (Columbia), Deputy, Project Development
  - X. Guo (BNL), Deputy, Business Management
  - H. Evans (Indiana), Technical Coordination & Systems Integration
- ❖ This team is very cohesive and well-integrated, having worked together in a number of capacities for many years.
  - DZero and, most recently, on the ATLAS Phase I Upgrade.
- ❖ The group brings much collective experience in all aspects of project management, development and execution.
  - Project and technical development, International ATLAS, navigating agency relations and approval processes, personnel management, administration, etc.
- ❖ Activities, approaches, etc. are developed collaboratively by this team, in tandem with the L2 Managers and their Deputies.



# HL-LHC Project Planning

- ❖ The U.S. processes and requirements must dovetail with International ATLAS processes and decision making.
  - TDR schedule defines the U.S. deliverables – “project start.”
  - CERN schedules define the delivery dates – “project completion.”
- ❖ Start and end dates, fixed by international constraints, must be properly folded into the planning, while still allowing for the execution of a U.S.-style project (413.3b/MREFC).
  - The DOE and NSF approval gates require a certain level of design maturity; the TDRs must be completed “on time,” but must also be sufficiently detailed to meet the maturity standard required by the U.S. review processes.
  - Note that the project is being asked to meet two different standards -- CD-2 level for NSF (PDR); CD-1 for DOE -- on the same time scales (~ end CY17).
- ❖ We continue to integrate all of these factors into our planning.



# Groups, Contacts and Meetings (1)

- ❖ PO personnel, L2 Managers and Deputies, and other U.S. project personnel continue to remain heavily engaged at CERN and with International ATLAS.
  - These include ongoing discussions about the evolving U.S. scope and involvement with the ATLAS Spokesperson, Upgrade and Technical Coordinators, Project Leaders, ATLAS Resource Coordinator, and others.
- ❖ The PO meets in the morning three times per week.
  - This is an extremely valuable time, during which we plan, compare notes, etc.
- ❖ Regular meetings between the PO and the Level 2 Managers and Deputies, and within the L2 systems, continue.
  - Weekly, or more frequently, as required.
- ❖ Site visits to U.S. ATLAS HL-LHC institutes are in the planning stage.
  - These invariably prove to be of great value.



## Groups, Contacts and Meetings (2)

### ❖ The PO is establishing a Project Advisory Group (PAG).

- The PAG will provide advice, guidance to the PO on project development and execution.
- M. Reichanadter (SLAC) has agreed to serve as Chair. Candidates have been identified and are being finalized, announcement is imminent.
- Consists of 6-7 experts well versed in all significant features of the HL-LHC project:
  - Navigating both DOE and NSF project requirements and approval processes; the ATLAS/CERN/International dimension; creating an optimized project U.S.-style plan/RLS; university, Laboratory and foreign representation; etc.

### ❖ BNL has established a HL-LHC Program Management Group (PMG) that will provide ~ monthly oversight of the Project.

- D. Lissauer, BNL Nuclear and Particle Physics Deputy ALD, will serve as Chair.
- The group will include university and laboratory membership.



## Groups, Contacts and Meetings (3)

- ❖ Discussions between the U.S. ATLAS and U.S. CMS HL-LHC Project Offices are being held ~ weekly, and have proven to be very useful.
- ❖ The Integrated Project Team (IPT) mandated by the DOE order has been expanded to include all HL-LHC stakeholders, and meets ~ bi-weekly.
  - BNL Federal Project Director, NSF Program Director, DOE Program Director, HL-LHC upper management, Phase I Project Manager, BNL Lab Management, DOE Site Office.
- ❖ The agencies have established a mini-JOG (Joint Oversight Group) which meets monthly – DOE, NSF, U.S. ATLAS, U.S. CMS.
  - This has turned out to be an extremely productive forum.
  - A bi-weekly extension to this meeting between the NSF Program Officer, DOE Program Manager and the U.S. ATLAS PO has been established which provides a forum for more in-depth follow up on any specific areas of concern.